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Human Machine Interface (HMI)
Interface Control Document
for the
Generation-3
Personnel Safety System
(PSS)
of the
Advanced Photon Source
at
Argonne National Laboratory
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1. Introduction


1.1. Scope

This document defines the connection of the PSS Human Machine Interface (HMI) to the PSS Command and Control system (C&C).

1.2. Definitions, acronyms, and abbreviations

The following are some of the frequently appearing or unique acronyms used in this document. This list is provided as a quick reference for the reader's convenience.

ACIS	Access Control Interlock System
APS	Advanced Photon Source
ASD	Accelerator Systems Division
BLEPS	Beam Line Equipment Protection System
CPU	Central Processing Unit
C&C	Command and Control
DOE	Department Of Energy
EPICS	Experimental Physics and Industrial Control System
ES&H	Environment, Safety & Health
ESD	Emergency Shut Down
HMI	Human Machine Interface
IOC	Input Output Controller (data collection for EPICS)
LAN	Local Area Network
OI	Operator Interface
PSS	Personnel Safety System
PLC(s)	Programmable Logic Controller
SAD	Safety Assessment Document
SDD	Software Design Document
SyRS	System Requirements Specification
TBD	To Be Defined/Decided
VME	Versa Module Euro card
XFD	Experimental Facilities Division

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1.3. Applicable Documents

The following documents form a part of this specification to the extent specified herein.

APS Documents

Document No. 1111-00001 APS Quality Assurance Plan, dated May 1990.

Document No. 4104-913124 HMI Soft –panel Design Specification for the Generation-3 Personnel Safety System, dated March 26, 2004.

Drawings

HMI mounting

Drawing No.4104xxxx-212061 beamline dependent – Assembly in cabinet door.

Electrical Connection Schematics


Drawing No. 4104xxxx-212153 beamline dependent.

Precedence

In the event of conflict between the provisions of this specification and other documents, the following precedence shall apply:

This specification.

Documents referenced to the extent referenced herein.

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1.4. References

Government Documents

The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

Department of Energy (DOE) ORDER 420.2A, 01-08-01
 Accelerator Safety Implementation Guide for DOE O 420.2A, Draft, August 2001
 DOE ORDER 5480.25, 11-3-92
 DOE GUIDANCE 5480.25, September 1, 1993

DOE ORDER and GUIDANCE 5480.25 are included because they were in effect and referenced when the Safety Assessment Document (SAD) was originally written; it has been superseded by DOE ORDER 420.2, which has been superseded by DOE ORDER 420.2A. DOE ORDER 420.2(A) essentially made the approved SAD the effective regulatory document.

Copies of specifications, standards, drawings and publications required by suppliers in connection with specified procurement functions should be obtained from the contracting agency or as directed by the contracting office.

Non-Government Documents

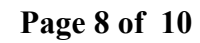
The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

Environment Safety & Health Manual, Section 5.16 (ES&H 5.16) April 25, 2003, Argonne National Laboratory.
 APS Safety Assessment Document (SAD), Rev 1, May 1999, Argonne National Laboratory, Argonne, IL.

Compliance with the following required by SAD:

Stanford Linear Accelerator Center Report 327 (SLAC 327), April 1988, Stanford Linear Accelerator Center, Menlo Park, CA.
 National Council on Radiation Protection Report No. 88 (NCRP 88), Issued 30 December 1986, National Council on Radiation Protection.
 Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal Agencies.


Document No. 1111-00001-00 APS Quality Assurance Plan, dated May 1990.

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1.6. Notes & Exceptions

All logic Signals are High True unless otherwise noted.

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2. Equipment and Responsibilities

1.7. Overview

The PSS HMI is the primary interface between the beamline Users and the PSS. It is used to provide status of the beamline to the users and allow the users to control most aspects of the beamline. However, it is not the only user control provided. The User controls also include a User key, an APS key (for each beamline station), and a Minor Fault Reset key and a Major Reset Fault key (for the whole beamline). There will normally be a PSS HMI Touch screen located at each beamline station.

1.8. Responsibilities and Interfaces

The entire responsibility for the design, programming, installation and maintenance belongs to the ASD Safety Interlocks group.

The only interface is the connection of each HMI Touch screen to the Ethernet hub that is used to connect all HMI Touch screens on a beamline to the Chain-C Command and Control processor.

1.9. Technical Requirements

The HMI Touch screen must be of industrial quality designed to operate 24 hours a day. It should have no moving parts to minimize maintenance and enhance reliability. The memory of the must remain valid even when powered down for several days.

1.10. Safety Implications

While the PSS HMI is the primary interface between the beamline Users and the PSS, if the HMI Touch screen should fail the users must be able to close the shutters rendering the beamline safe until the unit is repaired or replaced. If the HMI Touch screen fails, the users will close the shutters by turning off either the User key or the APS key. These keys are wired directly to the Chain-A, Chain-B and Chain-C PLCs and will always close the shutters if they are open or prevent them from opening if they are closed.

3. Interface Characteristics

The PSS HMI Touch screen only requires 2 connections to operate properly with the PSS. The first and most obvious is a power connection. All PSS HMI Touch screens will use 24 VDC as a power source. The typical power requirement is 2.5 to 3.0 amps at 24 VDC. The second connection is to the Command and Control (C&C) processor. This connection is made using CAT-5E Ethernet cable. The CAT-5E cable is required as the Ethernet connection operates at 100 mega-baud.

Refer to the drawings for proper connections between each HMI Touch screen and the PSS.